

2.1

Segment Bisectors

Goal Bisect a segment. Find the coordinates of the midpoint of a segment.

VOCABULARY

Midpoint

Segment bisector

Bisect

Example 1 Find Segment Lengths

M is the midpoint of \overline{AB} . Find AM and MB .



Solution

M is the midpoint of \overline{AB} , so AM is _____ of AB .

$$AM = \frac{1}{2} \cdot AB = \frac{1}{2} \cdot \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$MB = AM = \underline{\hspace{1cm}}$$

Answer $AM = \underline{\hspace{1cm}}$ and $MB = \underline{\hspace{1cm}}$.

Example 2 Find Segment Lengths

P is the midpoint of \overline{RS} . Find PS and RS .

**Solution**

P is the midpoint of \overline{RS} , so $PS = RP = \underline{\hspace{1cm}}$.

You know that RS is twice RP .

$$RS = \underline{\hspace{1cm}} \cdot RP = \underline{\hspace{1cm}} \cdot \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

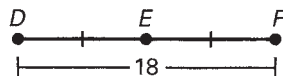
Answer $PS = \underline{\hspace{1cm}}$ and $RS = \underline{\hspace{1cm}}$.

Follow-Up

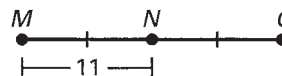
How are Examples 1 and 2 different?

✓ **Checkpoint** Complete the following exercises.

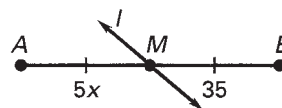
1. Find DE and EF .



2. Find NO and MO .

**Example 3** Use Algebra with Segment Lengths

Line l is a segment bisector of \overline{AB} .
Find the value of x .

**Solution**

M is the midpoint, so write an equation.

$$AM = MB$$

Substitute values for AM and MB .

$$\underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

Solve for x .

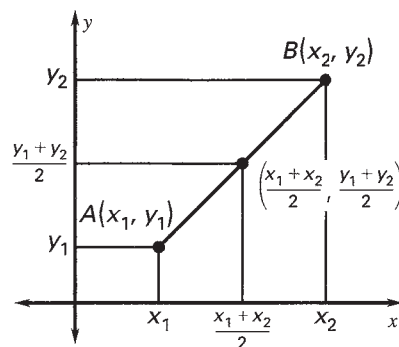
$$x = \underline{\hspace{1cm}}$$

THE MIDPOINT FORMULA

Words The coordinates of the midpoint of \overline{AB} are the _____ of the x-coordinates and the y-coordinates of the endpoints.

Symbols The midpoint of the segment joining $A(x_1, y_1)$ and $B(x_2, y_2)$ is

$$M\left(\underline{\hspace{1cm}}, \underline{\hspace{1cm}}\right).$$



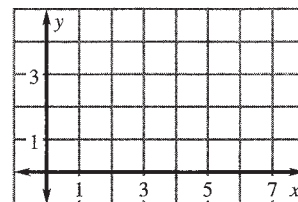
Example 4 Use the Midpoint Formula

Find the coordinates of the midpoint of \overline{AB} for $A(1, 2)$ and $B(7, 4)$.

Solution

Plot A and B. Draw \overline{AB} . Then use the Midpoint Formula. Let $(x_1, y_1) = (1, 2)$ and $(x_2, y_2) = (7, 4)$.

$$\begin{aligned} M &= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \\ &= \left(\underline{\hspace{1cm}}, \underline{\hspace{1cm}} \right) \\ &= (\underline{\hspace{1cm}}, \underline{\hspace{1cm}}) \end{aligned}$$



✓ **Checkpoint** Sketch \overline{PQ} . Then find the coordinates of its midpoint.

3. $P(2, 5)$, $Q(4, 3)$

